APR09-2009-000475

Abstract for an Invited Paper
for the APR09 Meeting of
the American Physical Society

Ion Heating from Magnetic Reconnection in Laboratory Plasmas[1]

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In many laboratory plasmas ions are much hotter than expected from classical heating mechanisms such as electron-ion collisions. Frequently, ion heating is observed during magnetic reconnection as result of conversion of magnetic energy into thermal energy. In many cases, magnetic reconnection and the associated heating occur impulsively, such as during sawtooth crashes in the tokamak and the Reversed Field Pinch (RFP). Even though this phenomenon has been observed for a long time specific mechanisms of the energy conversion are poorly understood. In this presentation I will cover examples of ion heating from many laboratory plasmas, including RFP, spherical tokamak, spheromak, reconnection experiments, and linear machines. Several mechanisms of ion heating including viscous damping of turbulent plasma flows and ion-cyclotron heating will be discussed.

[1]This work was supporter by the US D.O.E. and N.S.F.